Region and place:
Re-thinking regional development in the context of global environmental change

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Introduction

It has long been recognised that human activities have led to significant accumulations of environmental pollutants that are harmful to both non-human and human life. Recently, however, TV screens have been filled with images of glaciers melting at unprecedented rates, of extreme weather patterns that cause chaos to people and severe economic disruption, mounting evidence of secular climatic change. Much of this reflects the enormous expansion of movement of people and things around the world, transported by carbon-based modes of transport that create vast quantities of greenhouse gases (27% of all CO_2 emissions result form transport and this figure is still rising: Chapman, 2007). The growth of greenhouse gases is producing perhaps irreversible changes with potentially apocalyptic consequences to the ecological systems on which life on earth as we know it depends – and maybe sooner than we think, given the emergent properties of complex systems that we at best only partially understand. This recognition of human culpability is adding a new edge to debates about sustainability and raising questions about the implications of environmental changes for lifestyle and livelihood, especially as the worst consequences of such changes would impinge upon those people and places least able to cope with them. There are, therefore, strong ethical and moral dimensions to these issues.

Moreover, they have important implications for how we think about regional development and possible transitions to sustainable regions as a necessary element in a transition to a more sustainable planet. Can those who live in the core regions of the affluent global 'North', for example, continue to assume that relying on the global movements of commodities and people from distant regions to sustain their lifestyles will continue to be possible? And if they can't, which seems likely, what are the implications of this for concepts and definitions of what constitutes regional development (for example, see Pike et al, 2006, especially Chapter 8)? What will the looming global crisis of sustainability entail for both the theory and practice of regional development?

In the last decade or so, concepts of regions and regional development have been re-worked as part of the narratives of a globalising economy, rooted in the regulatory policies and practices of neo-liberalism. The emphasis in development discourse, especially in the global 'North', has increasingly come to focus on the notion of regions, and more latterly city regions , as key nodes in global networks of production and consumption and on their connections with other regions. For some, regions have become the key territorial units in an era of globalisation (for example, see Scott, 1998; Storper, 1995), although, arguably, the focus on the region is being replaced by a revived interest in city-regions as the pivotal territorial unit (see Scott and Storper, 2003; OECD, 2006). In either case, however, the emphasis is placed firmly upon endogenous growth processes, regional institutions and regionally-specific knowledges and learning, often explicitly linked to the existence of clusters of related economic activities in a region (for example, Porter 2000; 2003) – in short, on what has been termed the Territorial Innovations Models perspective on regional development (Moulaert and Sekia, 2003). While the emphasis is upon the deployment of regional assets as the basis of regional economic success in a globalising economy, this success is predicated upon the location of these regions in wider global circuits of capital: inputs flow in from other regions, outputs are sold outside the region. This is registered in the burgeoning literatures on global commodity chains, global value

chains and global production networks (for example, see Coe *et al*, 2004; Gereffi and Korzeniewicz, 2004; Gereffi *et al*, 2005; Henderson *et al*, 2002; Hess and Yeung, 2006; Smith *et al*, 2002). While there may be an emphasis upon building 'clusters' of activities within regions and so fostering the intra-regional cohesiveness of economies, this is seen as a way of enhancing global competitiveness and the ability to sell commodities made in a region in global markets.

For many regions in the global 'South', however, 'development' has been defined in much less sophisticated terms, with strong echoes of a colonial past. For some, it has involved restructuring agricultural production systems away from subsistence to cash-crop production, from production for domestic consumption to producing a range of 'exotic' fruits, vegetables and flowers for sale in the markets of the 'North'. For others, the emphasis has been upon becoming regions of export-oriented manufacturing of a range of consumer goods, typically tied into the supply chains of global brand owners based in the 'North', via the attraction of foreign direct investment. Such changes have typically been made in the context of external pressures, such as those of the World Bank's structural adjustment programmes. One consequence of this has been to raise a range of ethical and moral concerns about the re-orientation of production to export markets, about issues of health and safety at work and working conditions, the employment of child labour and so on, both among consumers in the 'North' and academic commentators (for example, Hughes, 2004; 2006; Jackson, 2002).

In summary, the policy focus in the peripheral 'losing' regions in both 'North' and 'South', those unfavourably positioned in such chains or networks, has shifted markedly. Such regions have sought in one way or another to re-position themselves more favourably in global circuits of capital, commodity movements and flows of value as the route to socio-economic well-being and development, often seeking explicitly to emulate the 'winning' regions. Regional development became de facto defined as successful re-positioning; to fail to do so was to

remain rooted at the bottom of the various chains or in the peripheries of networks. Successful regional development therefore involved the encouragement of a variety of flows (of commodities, money and people) into regions, processes of transformation and value-adding within those regions, and then subsequent sale and the flows of the resultant commodities out of regions, creating flows between regions scattered around the world with little or no regard for the ecological costs or, often, for the ethical consequences of so doing. Continuing with a mode of development that is predicated on encouraging global flows between regions widely dispersed around the world is increasingly problematic.

In contrast to this conception of development, might we not be forced to think seriously about returning to more localised and regionalised ways of living, predicated on a different conception of what constitutes development – because not to do so may well contribute in a major way to endangering life as we know it on the planet? If this needs to be done, how might it be done? Clearly a return to the closed regional world of the *pays* beloved by Paul Vidal de la Blache (1941) is not a feasible option. But what possibilities are there for moving onto development trajectories that aim to maximise intra-regional movement and cohesion and enhance the eco-efficiency of the processes of production, exchange and consumption that are constitutive of regional economies?

Regionalising economies: regions as sustainable economic spaces

There is potential to regionalise production activities in ways that enhance economic efficiency as well as reducing the ecological footprint of production, by minimising both wastes and the costs of moving materials between production processes and facilities. Consider the example of the Kalundborg eco-industrial park in Denmark, typically seen as a pre-eminent example of successful eco-industrial development (EID) (for other examples, see Cornell University, 2002; Scharb, 2001; Stone, 2002). Five industrial companies collaborate for mutual

economic and environmental benefit, closing material loops via exchanging different kinds of by-product, based on bi-lateral commercial agreements “built with economics in mind: the exchanges are not altruistic – they are driven by real profit incentives and the increased need for risk management” (Ferri and Cefola, 2002, 36). In this way, they convert by-products that might otherwise have been deposited in the environment as polluting wastes into valuable inputs into the production processes of adjacent companies. This has led to substantial cost saving and improved environmental performance, which confer a cost advantage for participating companies as well as delivering substantial environmental benefits.

Its proponents claim that EID *is* different, grounded in a biological analogy that “mimics the adaptive characteristics observed in nature by creating inter-firm relationships based on exchange and mutual gain”. Consequently, firms that practice EID successfully emulate nature’s adaptive processes and adjust their behaviour accordingly (Ferri and Cefola, 2002, 34-8). First, they take a holistic view of their economic environment and identify potential network partners. Secondly, they find interdependencies and engage in various resource exchanges. As well closing materials loops via re-cycling, recovery or re-use of wastes and enhancing eco-efficiency, EID offers strategies to achieve greater efficiency through economies of systems integration in which partnerships between businesses meet common services, transportation and infrastructure needs. Thirdly, they take advantage of exchanges to discover new products and process, suggesting that companies seeking eco-efficiency gains may become important spaces of innovation, knowledge creation and learning. Moreover, benefits spill over to local communities via environmental improvements, increased employment and more co-operative industrial relations. The emphasis is firmly upon EID creating win-win scenarios within regions.

The most feasible locations for successful eco-industrial developments are big densely populated regions, which best meet the three conditions seen as

necessary for such developments to be successful. First, there is an approximate balance between the demand for and supply of by-products, and therefore sufficient compatibility between firms within close proximity to ensure stable quantities and qualities of such by-products. Secondly, inter-firm relationships based upon close individual connections or within an institutional framework that reduces transaction costs. Thirdly, regulatory regimes that encourage collaborative inter-firm relationships rather than the disposing of by-products as wastes. Recognition of such issues is not new, however. Several decades ago Talbot identified the key issue as follows: “waste must be forthcoming in a steady stream of uniform volume to justify its exploitation, and the fashioning of these streams is the supreme difficulty” (Talbot, 1920, cited in Scharb, 2001, 22).

There are also other tensions associated with implementing EID. EID parks “aspire to zero emission or closed loop manufacturing” and “the total elimination of wastes” via exchanges of inputs and outputs (Spohn, 2002, 1). This has the added advantage of minimising the movement and transport of materials exchanged between companies. However, the emphasis on fostering networks among businesses and communities to optimise resource use and reduce economic and environmental costs has led to increasing recognition of the need to look at broader regional scales to ensure economies of scale and sufficient supply of exchange materials (Scharb, 2001, 1-2, 13). Consequently, firms involved in EID “network with other complementary firms within a particular region” (Ferri and Cefola, 2002, 35). EID clearly demonstrates the capacity to reduce wastes and the intra-regional movement of materials in the process of manufacturing by regionalising at least part of supply chains. It is, however, important to remember that there are limits to EID in that raw materials are typically imported into the region and finished products sold outside the region.

There are other ways of regionalising economic activities that can lead to a greater degree of regional closure of economies. Consider, for example, the regionalisation of food supply chains that has taken place over much of the

European Union, in part as a consequence of seeking to encourage healthier diets and greater consumption of fresh, locally produced, in part organic, foodstuffs (for an example see Hadjimichalis and Hudson, 2007). Such developments lead to more nutritious diets and so help reduce diet-related health problems such as cancers, diabetes, heart disease and obesity, while also creating markets to sustain regional agriculture. Furthermore, such developments can substantially reduce the ecological footprint of agriculture by reducing 'food miles' and CO_2 emissions as supply chains shorten and tonne-miles of food moved fall. Regionalisation of production and consumption does not automatically translate into a lower environmental footprint, however. For example, producing tomatoes in heated greenhouses in the UK may result in a greater carbon footprint than producing them out of doors in Spain and then transporting them to the UK for sale, emphasising the need for a full Life Cycle Analysis (see Hudson, 2001, 287-94).

It has also been claimed that agriculture could be made ecologically more efficient via food production 'factories' located in or near city-regions and/or densely populated regions. Such developments would lower transport and storage costs, enable a closer harmonisation of supply and demand and allow information about local needs and preferences (tastes, lifestyles etc) to be better integrated into the production process. Because production in controlled facilities would serve a known and defined regional population, feedback loops could be incorporated to allow just-in-time production, with ICT links between production units and retail outlets enabling supply and demand to be dovetailed in terms of variety, quality, quantity and timing (and in fact such supply chain management is already virtually ubiquitous among major food retailers). Creating precisely controlled localised growing environments would allow detailed specification of product characteristics and only foods that met specified consumer requirements would be produced. Such a system could yield major eco-efficiency gains, reducing fossil energy needs to almost zero, CO_2 inputs by a factor of 8 and

water use by a factor of 18, and so substantially lowering the environmental footprint of agriculture (Weaver *et al*, 2000, 113-6).

There is, therefore, considerable scope for more eco-efficient regionalised production and distribution of food. There is also potential for further eco-efficiency gains and the creation of more sustainable regions but realising this will require more generalised changes in food production systems and more general societal changes in diet, food preferences and tastes. Consumption of meat contributes significantly to the environmental impacts of agriculture. Industrial meat production from grain-fed livestock is an environmentally polluting and ecologically inefficient method of producing edible energy and protein, with the loss of 80-90% of the contained nutritional value of the feedstock (Lappé, 1991). Furthermore, the consumption of meat is heavily skewed towards more affluent regions of the globe, in which its consumption is both culturally sanctioned and affordable. For the two thirds of the global population who have a predominantly vegetarian diet, meat is an unaffordable luxury, even if it is culturally sanctioned.

This example of dietary variation and potential dietary change highlights the complexities of seeking to shift to more sustainable economic practices within a given region. Intra-regional change alone may be a necessary but not sufficient condition for regional transition. Novel foods could enable protein to be produced with much lower environmental impacts (with improvements in resource productivity in the order of 20 or 30) and at substantially lower economic cost. There are, however, major cultural, economic and social barriers to their adoption. Foods not only meet nutritional needs but also provide satisfaction for consumers through their aromas, flavours and textures. Moreover, “they also say something about us. Foods are used both to confer and confirm social standing. Important relationships and family occasions are marked by eating important foods”. As a result, “all in all, the concerns of consumers over conventional foods in eating norms and habits constitute significant barriers to dietary change”

(Weaver *et al*, 2000, 121-2). So too do major capitalist concerns and agri-businesses with vested interests in reproducing existing food production and distribution systems on which their profits depend. Consequently, there are considerable pressures militating against innovative and potentially more eco-efficient food products.

Big city-regions and densely-populated regions also have potential to become more sustainable spaces of consumption in other ways. This can be exemplified with reference to cleaning and washing clothing and other household textiles. Currently, many households in more affluent regions of the world perform these tasks in the house, using automatic washing machines and tumble driers. Such appliances are major consumer durables for many households and a source of profits for companies that produce them. These activities also have a heavy ecological footprint: they account for about 20% of household water and energy use in the Netherlands, for example (Weaver *et al*, 2000, 176). This partly reflects the way in which washing has symbolic and ritualistic, as well as functional, dimensions. Alternative laundering techniques with the potential to clean household textiles are inappropriate for use at the scale of the household. The eco-efficiency benefits that they can potentially yield in part depend upon up-scaling to more collective, regionalised provision. Assuming that cultural pressures for home-based systems could be overcome, the resultant scale economies would yield short-to-medium term eco-efficiency gains from recovering and re-using energy and materials and from matching cleaning treatment to need, reducing the resources used in the process per unit of laundry. Energy efficiencies in cleaning would need to be offset against the energy costs of delivering and collecting laundry within the region, but the net result would still be a reduction.

Regions as spaces of sustainable mobility and movement

Constructing sustainable regions will also require radical shifts in transport technologies and, over the longer-term, land use patterns. There is an intimate link between automobility (Urry, 1999) and lifestyle for many people, for whom mobility is an important element of their quality of life. In turn, this reflects the long-established and well-known power of the "road lobby" (Hamer, 1974) to promote its interests around the manufacture of cars and the construction of roads and other infrastructure on which to drive them. Thus land use patterns, transport demand and transport supply arrangements have co-evolved so that the capacity to be highly mobile and the demand for mobility have been mutually supportive. Reduction of the resultant environmental impacts could be achieved via some combination of demand management, more efficient methods of allocating people and goods to different modes of transport, changing modal splits and, in the longer term, technological change to produce more energy-effective modes of movement and enable "decarbonization of the economy", something that "is clearly of paramount importance" (Wernick *et. al*., 1997, 138). Such changes would also have the beneficial effect of helping address inequalities in mobility that have resulted from prioritisation of the private car as a mode of transport over much of the world.

For many people, then, constructing regions as sustainable spaces of consumption, movement and production within a decarbonising economy will require radically changing lifestyles as journeys to work, to shop, and for purposes of recreation are re-shaped and reduced in distance and people travel much more on foot, by bicycle or by various modes of public transport. For this to be possible, any meaningful longer term transition to sustainability will require major changes to the spatial arrangement of built environments, the relative locations of spaces of work, exchange, leisure, and residences and commensurate changes in peoples' activity patterns, spaces and dominant modes of travel. In brief, it will require a shift from built environments designed to maximise the movements required to go to work, shop and play to environments designed to minimise such movements within regions. Planning and designing

built environments to minimise movement will drastically alter the relative locations of spaces of dwelling, work and so on and also the scales at which these activities occur. There may well be resistance to such changes, even though innovations in ICTs, such as the Internet, make them a feasible option. For example, recent research in Finland reveals that telework has only led to a 0.7% reduction in total commuting kilometres travelled (Helminen and Risitimäki, 2007). Button and Taylor (2001, 30) note that such technological developments offer the potential to replace large-scale vehicle commuting by virtual offices in the home but also cite surveys of commuters in California, which reveal that only 2% wanted a zero to two minute commute while almost 50% preferred a commute of 30 minutes or more, suggesting resistance to the erosion of automobile-based lifestyles and the spatial separation of workplace and home. It would also be dangerous to underestimate the inertia built into built environments precisely because they are constituted via major outlays of fixed capital (both private and public sector investment), typically amortised or depreciated over decades. There are powerful economic imperatives to preserve existing socio-spatial structures, or at least slow the pace of change so that it does not endanger existing fixed capital investments and steer it so that it provides further scope for capital accumulation. It is an open question as to whether these economic imperatives are compatible with equally strong socio-ecological imperatives to shift to more sustainable forms of human activity.

Regions as spaces of waste disposal and re-cycling

While EID and related forms of development provide a means of dealing productively with some forms of wastes produced within regions, many regions simply export their environmental pollutants. For example, pollutants from coal fired power stations can be exported in molecular form via emissions from high chimney stacks. The expansion of international air and sea travel has resulted in significant emissions of pollutants into the largely unregulated global commons of

the atmosphere and oceans, with adverse environmental effects (German Advisory Council on Global Change, 2002). In other cases, waste products are exported in different forms, with a deliberate targeting of destination regions, often in the periphery of the global economy. For example, Yearley (1995) reported that Kassa Island, off the coast of Africa, became the recipient of highly-polluted incinerator ash from power stations in Philadelphia. Over a decade later, Houveld (2006) reported that a Greek-registered ship, chartered by a Dutch company, had discharged several hundred tons of highly toxic wastes, a poisonous mix of petrol wastes and cleaning agents, from its tanks at Abidjan, in the Ivory Coast. The sludge was then taken away by a local company, and dumped at ten sites around Abidjan. This led to thousands of people being hospitalised and several deaths.

In summary, as people in more economically developed countries came to understand the dangers posed by noxious pollutants, environmental standards were increased and it became more difficult to secure regions within those countries in which hazardous wastes could be deposited, pressures rose to find other ways of dealing with such pollutants. Exporting them was often cheaper than dealing with them at home, as this could involve considerable financial costs but, perhaps more significantly, political costs, in the face of NIMBYism ("not in my back yard") and opposition by residents to wastes being treated in "their region". However, local communities have differential capacity – indeed willingness - to resist, as Zonafeld demonstrated in her analysis of the French nuclear industry on the La Hague peninsula (Zonafeld, 1993). In the UK, nuclear waste has been re-processed at Sellafield, Cumbria, for some fifty years, with persistent worries as to the effects of accidents and the exposure of workers and local residents to radiation. Sellafield is located in a peripheral region, however, with few other employment opportunities. Moreover, "one of the best predictors of the location of toxic waste dumps in the United States is a geographical concentration of people of low income and color" (Harvey, 1996, 368). Indeed, poorer regions within the global North and peripheral states within the South

have engaged in bidding wars, seeking to become destinations for hazardous wastes in return for monetary payments and incomes. Increasing environmental standards have also led to new forms of inter-regional global trade in wastes. The activity of picking through waste to sort and re-cycle is labour intensive, poorly paid and of low social esteem. As such, it is exported to peripheral underdeveloped regions of the global economy – and justified as creating employment there.

Although international regulatory and trade agreements have halted the worst excesses of the trade in noxious wastes, the global 'North' still offloads its wastes onto the peripheries as wastes are shipped from Europe to China and Indonesia for sorting and re-use while ships are driven onto beaches in Bangladesh and India to be taken apart and their constitutive material re-cycled (for example, see Buerk, 2006). The international trade in pollutants is complex, however, and there are also flows among regions in core countries. For example, in the first years of the present century, derelict and heavily polluted USA navy "ghost ships" were moved to Hartlepool in north east England for dismantling, although this activity has yet to commence because the local planning authority refuses to grant planning permission. In the 1990s Japanese nuclear waste was shipped to Sellafield in the UK for re-processing before being returned to Japan.[1] Export of wastes can be problematic for exporters, however, as the impacts of pollution return to blight their origin regions. For example, factories re-located from the USA into the maquiladora border zone in Mexico in response, *inter alia*, to less stringent environmental regulations there subsequently exported air pollution, sewage and contaminated food back to the USA as "ecological havoc recognises no boundaries" (George, 1992, 6). This exemplifies a broader point: that in the final analysis, much of the pollutant effects of contemporary economic activity are neither simply regional nor regionalisable. They cannot be contained via spatial

[1] These issues of the production of, international trade in, and re-use of wastes are being investigated in a major and research project funded by the UK Economic and Social Research Council, involving anthropologists, geographers and engineers in the Universities of Durham and Sheffield, in University College London and in Goldsmiths College, London. For further details see the project web site: http://www.thewasteoftheworld.org/

fixes, only displaced to other regions, from which they continue impact upon the global environment.

Re-defining regional development? Sustainable regions and the contradictions of capital

For some time now, there has been a strong emphasis in mainstream development discourse and policy on positioning regions more favourably in global commodity and value chains and global production networks, up-grading their position in terms of links with other regions and locations. So economic development and 'success' were seen as integrally linked to creating connections with and flows to other regions, maximising inter-regional flows, often on a global scale. Now there is an increasingly strong imperative to move towards more self-contained and sustainable models of regional development, maximising intra-regional flows and connections (in part to help close materials loops) in terms of environmentally less damaging processes of production, exchange and consumption. It is, however, unrealistic to expect complete closure – or that all regions can be self-sufficient. Consequently, this raises important questions as to the extent to which regional 'closure' is possible and the effects of such partial closure on the lifestyles and livelihoods of people who live and work in particular regions, in both the 'North' and 'South'.

This has particularly important implications, however, for those marginalised regions in the 'South' that have embarked - often with little choice – on 'development' strategies based upon transforming local economies to find a niche in global production systems, whether in agriculture (a range of exotic fruits and vegetables, cut flowers) or as Free Production Zones for export-oriented manufacturing. While the ethical concerns and pressures from 'Northern' consumer groups and NGOs for 'fair trade' and better working conditions for factory workers (banning child labour, regulating terms, conditions and hours of

work, improving health and safety etc) are laudable and important, it is also important to bear in mind that they are predicated on these regions forming parts of global production systems. But what are the implications of these regions seeking to de-couple from such systems and switch to more autonomous and environmentally less damaging development trajectories, centred on maximising regionalised production and consumption, while acknowledging that there are limits to both what can be produced and sold in a given region? Indeed, what are the practical possibilities for seeking to re-orientate regional development in these ways, given the imperatives of capital accumulation, the contradictory character of capitalist development and the difficulties of moving to non-capitalist models? The prognosis is not a promising one, but the answer to this question will have consequences that are not simply regional but global

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